AMENDMENTS TO THE CLAIMS

Pursuant to 37 CFR §121(c), the claim listing, including the text of the claims, will serve to replace all prior versions of the claims in the application.

Please amend claims 1 through 4, 6 through 9, 11 through 13, 15 through 18, as follows:

Listing of Claims:

1. (Currently amended) A deframing method, comprising:

receiving PPP frame data corresponding to a session number, storing, by a network controller, the PPP frame data in a packet memory in dependence upon the session number, and storing reassembling information corresponding to the session number, ~~said receiving and said storing of the PPP frame data and said storing of the reassembling information being performed by a network controller,~~ the PPP frame data being data conforming to a point-to-point protocol and being fragmented; and

when said receiving has been completed, reading, by an IP frame generator, the PPP frame data from the packet memory and reassembling the read PPP frame data into one integrated piece of [[PPP]] IP packet data, ~~said reading and reassembling being performed by a point-to-point protocol deframing processor,~~ said reassembling being performed in dependence upon the reassembling information, the [[PPP]] IP packet data being data conforming to the ~~point-to-point~~ internet protocol,

with the ~~point-to-point protocol deframing processor~~ IP frame generator and the network

controller being included in a packet data serving node (PDSN) in a mobile communication system, the mobile communication system [[including]] comprising a base transceiver station, a plurality of mobile stations linked through radio channels with the base transceiver station, and a host connected with the packet data serving node through an Internet network based on an Internet protocol, the packet data serving node connected with the base transceiver station through general routing encapsulation tunneling based on the point-to-point protocol, the packet data serving node further comprising a PPP frame generator for converting the IP packet data received from the host into a plurality of pieces of PPP frame data, with the PPP frame generator and the IP frame generator being hardware modules separate from each other, the mobile communication system converting PPP frame data received from the base transceiver station into IP packet data and transferring the IP packet data to the host, the IP packet data conforming to the Internet protocol.

2. (Currently amended) The deframing method of claim 1, further comprising:

storing de-stuffing information in the packet memory; and

de-stuffing the PPP frame data, said storing of the de-stuffing information being performed by the network controller, said de-stuffing being performed by the ~~point-to-point protocol deframing processor~~ IP frame generator.

3. (Currently amended) The deframing method of claim [[1]] 4, with said reassembling of the PPP frame data comprising:

~~reading the PPP frame data, the reassembling information, and de-stuffing information, each~~

~~corresponding to the session number, through a predetermined bus connected to the packet memory;~~

~~when stuffed data have been recorded in an information field of the PPP frame data,~~

~~performing byte de-stuffing for the stuffed data in dependence upon the read de-stuffing information;~~

inputting the session number corresponding to the PPP frame data to generate a memory address corresponding to the session number;

temporarily storing the byte de-stuffed PPP frame data in accordance with the generated memory address; and

when reception of all of the PPP frame data corresponding to the session number has been completed, outputting the one integrated piece of [[PPP]] IP packet data formed of the PPP frame data stored according to the memory address.

4. (Currently amended) ~~The deframing method of claim 3,~~ A deframing method, comprising:

receiving PPP frame data corresponding to a session number, storing the PPP frame data, reassembling information and de-stuffing information corresponding to the session number in a packet memory, said receiving and said storing of the PPP frame data, the reassembling information and de-stuffing information being performed by a network controller, the PPP frame data being data conforming to a point-to-point protocol and being fragmented; and

when said receiving has been completed, reading the PPP frame data, reassembling information and de-stuffing information, each corresponding to the session number, from the packet memory;

when stuffed data have been recorded in an information field of the PPP frame data,

performing byte de-stuffing for the stuffed data in dependence upon the read de-stuffing information; and

reassembling the read PPP frame data into one integrated piece of IP packet data, said reading, de-stuffing and reassembling being performed by an IP frame generator, said reassembling being performed in dependence upon the reassembling information, the IP packet data being data conforming to the point-to-point protocol, the IP frame generator and network controller being included in a packet data serving node in a mobile communication system, the mobile communication system including a base transceiver station, a plurality of mobile stations linked through radio channels with the base transceiver station, and a host connected with the packet data serving node through an Internet network based on an Internet protocol, the packet data serving node connected with the base transceiver station through general routing encapsulation tunneling based on the point-to-point protocol, the mobile communication system converting PPP frame data received from the base transceiver station into IP packet data and transferring the IP packet data to the host, the IP packet data conforming to the Internet protocol, with said byte de-stuffing further comprising:

detecting whether a start flag is in the PPP frame data, and eliminating any start flag detected in the PPP frame data;

detecting whether an end flag is in the PPP frame data and eliminating any end flag detected in the PPP frame data, the session number corresponding to a first session number;

receiving a second session number distinguishable from the first session number, and, when the second session number is received in a state in which the end flag has been

detected, reporting that reception of all of the PPP frame data corresponding to the first session number has been completed;

when at least one selected from among the start flag and the end flag has been eliminated, detecting whether the data recorded in the information field of the PPP frame data has been stuffed;

when the data recorded in the information field of the PPP frame data has not been stuffed, outputting the data recorded in the information field; and

when the data recorded in the information field of the PPP frame data has been stuffed, performing de-stuffing for the data recorded in the information field and then outputting the de-stuffed data.

5. (Original) The deframing method of claim 4, further comprising:

detecting whether the PPP frame data is normal in dependence upon cyclic redundancy check information corresponding to the PPP frame data, the cyclic redundancy check information being obtained after said detecting of whether the end flag is in the PPP frame data.

6. (Currently amended) A deframing apparatus, comprising:

a packet data serving node (PDSN) in a mobile communication system, the mobile communication system including a base transceiver station, a plurality of mobile stations linked through radio channels with the base transceiver station, and a host connected with the packet data serving node through an Internet network based on an Internet protocol, the packet data serving node

connected with the base transceiver station through general routing encapsulation tunneling based on a point-to-point protocol, the mobile communication system converting PPP frame data received from the base transceiver station into IP packet data and transferring the IP packet data to the host, the PPP frame data conforming to a point-to-point protocol and being fragmented, the IP packet data conforming to an Internet protocol, the PPP frame data corresponding to a session number, said packet data serving node comprising:

a network controller receiving the PPP frame data and outputting the PPP frame data together with reassembling information in dependence upon the session number corresponding to the PPP frame data, the reassembling information having been negotiated when a point-to-point protocol link between the base transceiver station and said network controller is set;

a packet memory being in communication with said network controller, said packet memory storing the PPP frame data and the reassembling information received from the network controller in dependence upon the session number corresponding to the PPP frame data; ~~and~~

a ~~point-to-point protocol deframing processor~~ IP frame generator being in communication with the network controller, said ~~point-to-point protocol deframing processor~~ IP frame generator reading the PPP frame data corresponding to the session number and reading the reassembling information from the packet memory and reassembling the read PPP frame data according to the reassembling information when reception of all PPP frame data corresponding to the session number has been completed, to generate one integrated

piece of [[PPP]] IP packet data, the [[PPP]] IP packet data being data conforming to the ~~point-to-point~~ Internet protocol; and

a PPP frame generator being in communication with the network controller and converting the IP packet data received from the host into a plurality of pieces of PPP frame data, with the PPP frame generator and the IP frame generator being hardware modules separate from each other.

7. (Currently amended) The deframing apparatus of claim 6, with said ~~point-to-point protocol deframing processor~~ IP frame generator reading de-stuffing information from said packet memory, and performing de-stuffing for the corresponding PPP frame data in accordance with the read de-stuffing information, the de-stuffing information being stored according to the session number by said network controller.

8. (Currently amended) The deframing apparatus of claim [[7]] 9, with said ~~point-to-point protocol deframing processor~~ IP frame generator further comprising:

an interface interfacing with said packet memory when the reception of all PPP frame data corresponding to the session number has been completed;

a direct memory access controller controlling the interface;

a reception buffer temporarily storing the PPP frame data transferred by a first bit unit through said interface and outputting the stored PPP frame data by a second bit unit distinguishable from the first bit unit;

~~a byte de-stuffing processor performing byte de-stuffing for any stuffed data recorded in an information field of the PPP frame data in accordance with the de-stuffing information and the reassembling information provided through said interface;~~

an address generator inputting the session number of the PPP frame data to generate a memory address corresponding to the session number;

a memory storing the PPP frame data received from the byte de-stuffing processor according to the memory address; and

a transmission buffer receiving the byte de-stuffed PPP frame data from said memory according to the memory address and buffering the one integrated piece of [[PPP]] IP packet data to said interface.

9. (Current amended) ~~The deframing apparatus of claim 8;~~ A deframing apparatus, comprising:

a packet data serving node in a mobile communication system, the mobile communication system including a base transceiver station, a plurality of mobile stations linked through radio channels with the base transceiver station, and a host connected with the packet data serving node through an Internet network based on an Internet protocol, the packet data serving node connected with the base transceiver station through general routing encapsulation tunneling based on a point-to-point protocol, the mobile communication system converting PPP frame data received from the base transceiver station into IP packet data and transferring the IP packet data to the host, the PPP frame data conforming to a point-to-point protocol and being fragmented, the IP packet data conforming

to an Internet protocol, the PPP frame data corresponding to a session number, said packet data serving node comprising:

a network controller receiving the PPP frame data and outputting the PPP frame data together with reassembling information and de-stuffing information in dependence upon the session number corresponding to the PPP frame data, the reassembling information having been negotiated when a point-to-point protocol link between the base transceiver station and said network controller is set;

a packet memory being in communication with said network controller, said packet memory storing the PPP frame data, the reassembling information and the de-stuffing information received from the network controller in dependence upon the session number corresponding to the PPP frame data; and

an IP frame generator being in communication with the network controller, said IP frame generator reading the PPP frame data corresponding to the session number and reading the reassembling information and de-stuffing information from the packet memory, and reassembling the read PPP frame data according to the reassembling information when reception of all PPP frame data corresponding to the session number has been completed, to generate one integrated piece of IP packet data, the IP packet data being data conforming to the Internet protocol, and IP frame generator comprising a byte de-stuffing processor performing byte de-stuffing for any stuffed data recorded in an information field of the PPP frame data in accordance with the de-stuffing information and the reassembling information, with said byte de-stuffing processor comprising:

a start flag search and eliminating unit detecting whether a start flag is in the PPP frame data and eliminating any start flag in the PPP frame data;

an end flag search and eliminating unit detecting whether an end flag is in the PPP frame data and eliminating any end flag in the PPP frame data, the session number corresponding to a first session number;

a control data register receiving a second session number distinguishable from the first session number, and, when the second session number is received in a state in which the end flag has been detected, reporting to said memory that reception of all of the PPP frame data corresponding to the first session number has been completed;

a byte stuffing search unit detecting whether the data recorded in the information field of the PPP frame data from which header information has been eliminated has been stuffed, and outputting the data recorded in the information field when the data has not been stuffed; and

a byte de-stuffer performing de-stuffing for the data recorded in the information field and outputting the de-stuffed data to said memory when the data has been stuffed.

10. (Original) The deframing apparatus of claim 9, further comprising a cyclic redundancy check and comparison unit detecting whether the PPP frame data is normal by means of cyclic redundancy check information of the PPP frame data, the cyclic redundancy check information of the PPP frame data being obtained when said byte stuffing search unit detects whether the data recorded in the information field has been stuffed.

11. (Currently amended) A framing method, comprising:

storing, by a network controller, [[PPP]] IP packet data and control information corresponding to the [[PPP]] IP packet data in a packet memory~~, said storing being performed by a network controller, the PPP packet data being one integrated piece of PPP packet data and conforming a point-to-point protocol~~;

reading, by a PPP frame generator, the [[PPP]] IP packet data and the control information from the packet memory; and

fragmenting, by the PPP frame generator, the read [[PPP]] IP packet data into a plurality of pieces of PPP frame data according to size information included in the control information, the PPP frame data being data conforming the point-to-point protocol, ~~said reading and fragmenting being performed by a point-to-point protocol framing processor,~~ the plurality of pieces of PPP frame data including a first piece of PPP frame data and a last piece of PPP frame data, with a start flag being inserted into the first piece of PPP frame data and an end flag being inserted into the last piece of PPP frame data[[,]]; and

the plurality of pieces of PPP frame data being transmitted by the network controller to a base transceiver station,

with the network controller and the ~~point-to-point protocol framing processor~~ PPP frame generator being included in a packet data serving node (PSDN) in a mobile communication system, the mobile communication system including the base transceiver station, a plurality of mobile stations linked through radio channels with the base transceiver station, and a host connected with the packet data serving node through an Internet network based on an Internet protocol, the packet data serving node being connected with the base transceiver station through general routing

encapsulation tunneling based on the point-to-point protocol, the packet data serving node further comprising an IP frame generator for converting the PPP frame data received from the base transceiver station into IP packet data, with both the IP frame generator and the PPP frame generator being hardware modules separate from each other, the mobile communication system converting IP packet data received from the host into the PPP frame data and transferring the PPP frame data to the base transceiver station, the IP packet data conforming to the Internet protocol.

12. (Currently amended) The framing method of claim 11, further comprising performing stuffing for each piece of the PPP frame data when stuffing is required by the control information, said stuffing being performed by the ~~point-to-point protocol framing processor~~ PPP frame generator.

13. (Currently amended) ~~The framing method of claim 12,~~ A framing method, comprising:

storing, by a network controller, IP packet data and control information corresponding to the IP packet data in a packet memory;

reading, by a PPP frame generator, the IP packet data and the control information from the packet memory;

fragmenting, by the PPP frame generator, the read IP packet data into a plurality of pieces of PPP frame data according to size information included in the control information, the PPP frame data being data conforming the point-to-point protocol, said reading and fragmenting being performed by a PPP frame generator; and

performing stuffing for each piece of the PPP frame data when stuffing is required by the

control information, the plurality of pieces of PPP frame data including a first piece of PPP frame data and a last piece of PPP frame data, with a start flag being inserted into the first piece of PPP frame data and an end flag being inserted into the last piece of PPP frame data, the plurality of pieces of PPP frame data being transmitted to a base transceiver station, the network controller and the PPP frame generator being included in a packet data serving node (PDSN) in a mobile communication system, the mobile communication system including the base transceiver station, a plurality of mobile stations linked through radio channels with the base transceiver station, and a host connected with the packet data serving node through an Internet network based on an Internet protocol, the packet data serving node being connected with the base transceiver station through general routing encapsulation tunneling based on the point-to-point protocol, the mobile communication system converting IP packet data received from the host into the PPP frame data and transferring the PPP frame data to the base transceiver station, the IP packet data conforming to the Internet protocol, with said fragmenting the read [[PPP]] IP packet data comprising:

converting a flag value into a byte value, the flag value being negotiated when a point-to-point protocol link is set up, and setting the byte value as a reference value, and comparing the [[PPP]] IP packet data with the reference value to detect an end flag;

determining whether to perform byte stuffing in dependence upon any detection of the end flag;

performing byte stuffing only for [[PPP]] the IP packet data equal to the reference value; and

outputting the plurality of pieces of PPP frame data in accordance with the size

information.

14. (Original) The framing method of claim 13, further comprising:

calculating a cyclic redundancy check value for each of the plurality of pieces of PPP frame data and inserting calculated cyclic redundancy check values in the plurality of pieces of PPP frame data.

15. (Currently amended) A framing apparatus, comprising:

a packet data serving node in a mobile communication system, the mobile communication system including a base transceiver station, a plurality of mobile stations linked through radio channels with the base transceiver station, and a host connected with the packet data serving node through an Internet network based on an Internet protocol, the packet data serving node connected with the base transceiver station through general routing encapsulation tunneling based on a point-to-point protocol, the mobile communication system converting IP packet data received from the host into a plurality of pieces of PPP frame data and transferring the pieces of the PPP frame data to the base transceiver station, the IP packet data conforming to an Internet protocol, said packet data serving node framing one integrated piece of [[PPP]] IP packet data into a plurality of pieces of the PPP frame data, the plurality of pieces of the PPP frame data including a first piece of PPP frame data and a last piece of PPP frame data, ~~the PPP packet data conforming to a point-to-point protocol,~~ the PPP frame data conforming the point-to-point protocol and being fragmented, each of the pieces of the PPP frame data corresponding to a session number, said packet data serving node comprising:

a network controller receiving the [[PPP]] IP packet data and outputting the received [[PPP]] IP packet data with control information corresponding to the [[PPP]] IP packet data;

a packet memory being in communication with said network controller, said packet memory storing the [[PPP]] IP packet data and the control information provided from said network controller; ~~and~~

a ~~point-to-point protocol framing processor~~ PPP frame generator being in communication with said network controller, said ~~point-to-point protocol framing processor~~ PPP frame generator reading the [[PPP]] IP packet data with the control information corresponding to the [[PPP]] IP packet data from said packet memory and fragmenting the read [[PPP]] IP packet data into a plurality of pieces of PPP frame data in accordance with size information included in the control information, said ~~point-to-point protocol framing processor~~ PPP frame generator inserting a start flag into the first piece of PPP frame data and an end flag into the last piece of PPP frame data and transmitting the plurality of pieces of PPP frame data to the base transceiver station; and

an IP frame generator being in communication with said network controller and converting the PPP frame data received from the base transceiver station to IP packet data, with the IP frame generator and the PPP frame generator being hardware modules separate from each other.

16. (Currently amended) The framing apparatus of claim 15, with said ~~point-to-point protocol framing processor~~ PPP frame generator performing a stuffing operation for each piece of

the PPP frame data in dependence upon the control information.

17. (Currently amended) ~~The framing apparatus of claim 16,~~ A framing apparatus, comprising:

a packet data serving node in a mobile communication system, the mobile communication system including a base transceiver station, a plurality of mobile stations linked through radio channels with the base transceiver station, and a host connected with the packet data serving node through an Internet network based on an Internet protocol, the packet data serving node connected with the base transceiver station through general routing encapsulation tunneling based on a point-to-point protocol, the mobile communication system converting IP packet data received from the host into a plurality of pieces of PPP frame data and transferring the pieces of the PPP frame data to the base transceiver station, the IP packet data conforming to an Internet protocol, said packet data serving node framing one integrated piece of IP packet data into a plurality of pieces of the PPP frame data, the plurality of pieces of the PPP frame data including a first piece of PPP frame data and a last piece of PPP frame data, the PPP frame data conforming the point-to-point protocol and being fragmented, each of the pieces of the PPP frame data corresponding to a session number, said packet data serving node comprising:

a network controller receiving the IP packet data and outputting the received IP packet data with control information corresponding to the IP packet data;

a packet memory being in communication with said network controller, said packet memory storing the IP packet data and the control information provided from said network controller; and

a PPP frame generator being in communication with said network controller, said PPP frame generator reading the IP packet data with the control information corresponding to the IP packet data from said packet memory and fragmenting the read IP packet data into a plurality of pieces of PPP frame data in accordance with size information included in the control information, performing a stuffing operation for each piece of the PPP frame data in dependence upon the control information, inserting a start flag into the first piece of PPP frame data and an end flag into the last piece of PPP frame data, and transmitting the plurality of pieces of PPP frame data to the base transceiver station, with said ~~point-to-point protocol framing processor~~ PPP frame generator comprising:

a control data register outputting a flag value negotiated when a point-to-point protocol link is established;

a stuffing option comparator converting the flag value into a byte value, setting the byte value as a reference value, and comparing the [[PPP]] IP packet data with the reference value to detect an end flag;

determining whether to perform byte stuffing in dependence upon the detection of the end flag; and

a byte stuffer performing byte stuffing only for [[PPP]] the IP packet data equal to the reference value and then outputting the [[PPP]] stuffed IP packet data.

18. (Currently amended) The framing apparatus of claim 17, further comprising a cyclic redundancy check calculation and an inserting unit calculating a cyclic redundancy check value for each one of the plurality of pieces of the PPP frame data and then inserting calculated cyclic

redundancy check values in the plurality of pieces of the PPP frame data.